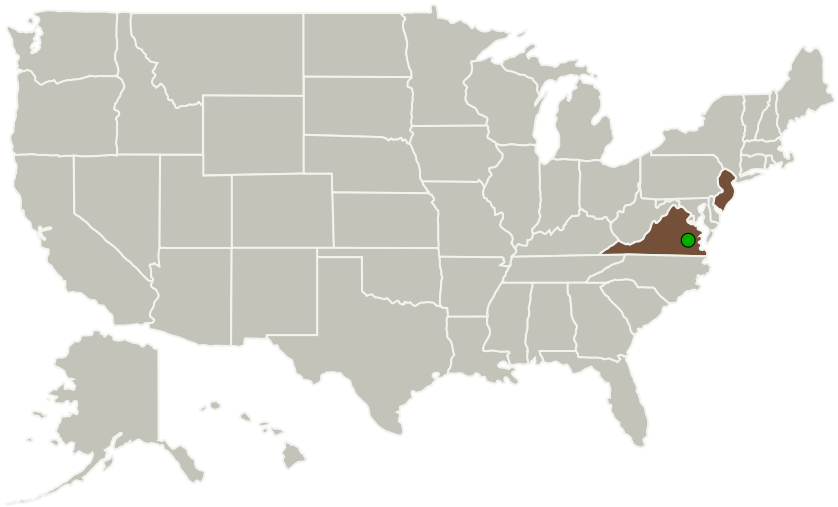
Expandable/Foldable Structures for Habitat, Phase II

Completed Technology Project (2011 - 2013)

Project Introduction

Folded Structures Company (FSC) has developed an innovative design approach for multi-laminate, primary and secondary structures for planetary habitats that integrates the dynamic deployment means with the static structural design using an advanced mathematical folding theory. The design approach holds the promise of a much simpler expandable structure that is both lightweight and compactable (low delivery volume) and yet capable of extending into an expansive volume. FSC research supports the utilization of a new class of deployable, space-based structures that utilize an advanced folding methodology as the primary engineering and assembly method combined with the use of both single and multi-laminate sheet materials. The proprietary patterning algorithms create tessellations for planar sheets that articulate dynamically on the edges of the tessellation allowing for uniform deployment across the entire sheet. Previous to the development of these algorithms, there was no general system for generating doubly periodic folded structures. Based on results from a previous NASA SBIR project, FSC will apply its proprietary folding techniques and software to the broad topic of expandable habitat structures. The Phase I project has resulted in a design concept for the expandable bladder section of the proposed lunar habitat that also integrates the flooring into a single deployable structure.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Folded Structures Company, LLC	Lead Organization	Industry	Ringoes, New Jersey
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
New Jersey	Virginia

Project Transitions

June 2011: Project Start

September 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138847)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Folded Structures Company, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Daniel Kling

Co-Investigator:

Daniel Kling

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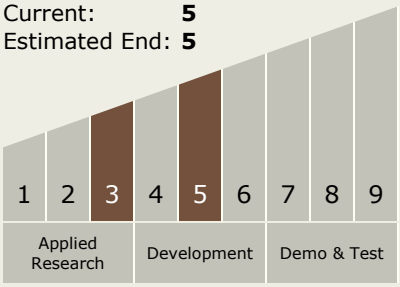
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.2 Structures
    - TX12.2.5 Innovative, Multifunctional Concepts

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System